Ecological studies on Soil Algae in Marathwada region of Maharashtra.

A Synopsis Submitted to

Swami Ramanand Teerth Marathwada University, Nanded

For the Registration of Ph. D. (Botany)

Under the Faculty of

Science and Technology

Submitted by

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A] Title of the proposed Research

"Ecological Studies on Soil Algae in Marathwada region of Maharashtra." B]

Introduction/ Origin of Research Problem:

Soil can serve as model for studying the soil ecosystem. With increase in desertification anthropropegenic perturbation, erosion, etc. impacting soils, there is an urgent need to protect and improve soil fertility. The diversity of soil algae plays an important role in soil genesis, stabilization of soils, soil friability, and enrichment of nitrogen via nitrogen fixation and build-up of organic contents. The soil is one of the most important natural resource of an earth. Soil is a complex mixture of minerals, organic matter, air and water, countless living organisms that together support the growth of plant life and is vital to life on earth. It forms the surface of land as it is the, "skin of the earth". Algae are the large and diverse group of plant kingdom comprising simple, typically autotrophic organisms, ranging from unicellular to multicellular forms. It is a photosynthetic form of life found abundant in aquatic and terrestrial ecosystems of nature. They are found in variety of habitats such as fresh water, marine water, on snow, on rocks, on or in soil and also on the bark of tress. Algae are important members of plant world and several of them are significant to man in many ways. They are beneficial in the field of Agriculture, Industry, Medical Science, Space research, Bio-diesel production and Bioremediation. Algae being photosynthetic autotrophs constitutes an important group of soil micro biota. A soil alga generally occurs on or in soil and grows in abundance and found in diverse form. Soil algae play a significant role in fertility of soil. Terrestrial blue green algae are ecologically important as many species can fix atmospheric nitrogen. The ecological value of soil algae is important as they protect soil from wind erosion and also act as an absorptive organ for water or moisture. Studies on soil algae will gained great prominence since last four decades as they plays important role in the economy of soil.

In proposed research work, biodiversity study of algae in different soil, mainly cultivated, noncultivated, rocky, sandy soils will be studied scientifically. In cultivated soil study, algal flora of different selected crop fields (Kharif and Rabbi) crops will be studied; simultaneously algal flora of non-cultivated fields will be worked out. Comparative analysis in terms of qualitative and quantitative abundance of algal flora will be performed. Physico chemical parameters of soil also play an important role in diversity and abundance of soil algal flora. Selected physico chemical parameters of soils will be studied to correlate diversity and abundance of soil algae.

While studying algae flora of different crop fields an efforts will be made to study algae in the rhizospheres of some crop plants (Rhizosphere algae).Algae samples present in or on moist soil will be collected from field, identified with the help of standard literature on algae. Surface soil samples also will be collected and cultured for their algal components. The proposed research work will be beneficial in the field of soil science, soil microbiology, ecology, phycology, biodiversity and in agriculture. India has a very rich and diversified algal flora. In the present century great advances have been made in the investigation of fresh water algae, marine algae, atmospheric micro algae but very few workers Marathe (1967, 1969), Patel (1973), Bhoge and Goyal (1985) and Ragothaman (2007) have paid attention on soil algae, to fulfill this lacuna it has been decided to work on this aspect.

C) Review of Literature including National and International Status:

Akiyama, M. (1961, 1970). Studied on aerial and terrestrial algae in San-in-region of Honshu, Japan., Akiyama, M. (1970) worked out on soil algae of Arctic, Alaska, Canada and Greenland, Bischoff, M.W(1893),Bolter, M.(2001), Booth, W.E.(1941), Bristol, B.M.(1919,1920,1926,1927), Broady, P.A.(1976, 1977a, 1977b, 1979a,1979b, 1979c,1982, 1989, 1996), Cameron, R.E.(1960,1972), Desikachary, T.V.(1959), Feher, R.(1948), Fritsch, F.E.(1922,1923), Fritsch, F. E. and John, R.P.(1942), Gollerbrach, M.M.(1969,1988), HolmHansen, O.(1969), Hoffmann, L.(1989), James, E.J(1935), Luke ova, A. and Hoffman, L.(1996), Lukesova, A. Komarek, J.(1987), Lund, J.W.(1946,1947,1962), Novichkova- Ivanova, L.N.(1972,1980), Ohtani, S. and Kanda, H.(991), Peterson, J.B.(1928,1932 and 1935), Shields, L.M.(1962), Starks, T.L., Shubert, L.E.(1981),West, N.E(1990).

In India soil algae attracted the attention of phycologists for the past few decades. Anand, N. and Revathi, G. (1987) studied green algae from the rice fields of Tamilnadu Auti, B.K. and Pingle, S.D. (2006) isolated blue green algae from sugarcane fields, Bhoge, O.N. Narkhede, P.N. and Ragothaman, G. (2007).Bongale and Bharati (1985), Chaporkar, C.B. and Gangawane, L.V. (1985), Cherian, K.J. (1983), Dixit, S.C. (1936).Kottawar and Pachpande (1986) Soil algae of banana fields of Jalgaon district . Prasad (2005), Auti and Pingale (2006). Algal biodiversity of Paddy, Banana, Wheat, Rice ,Sugarcane, Sorghum fields has been well documented .Bhongale and Bharati (1980), Santra (1983), Chaporkar and Gangawane (1984), Gonzalves, E.A.and Gangla, K.S. (1949), Jadhav (2010), Kamat, N.D.and Patel, M.I. (1973),Kolte and Goyal (1985), Kottawar and Panchpande (1986), Patil and Chaugule (2004), Sardeshpande, J.S. and Goyal, S.K. (1981) Distribution pattern of BGA in Rice field soils of Maharashtra, Yadav, S.G. and Awasthi, R.S. (2013) Distributional pattern of Cyanobacteria from the rice field soils of Latur district (MS) India. Yadav, S.G. (2020).studied phycoflora associated with the Rhizosphere of Rice Fields.

D) Aims and Objectives of the Proposed Research:

The main objectives of the proposed research work leading to the Ph.D. degree are as follows.

i) To study the algal flora of cultivated fields under which different crop fields of study area will be worked out. ii) To study algal flora of non-cultivated fields of study area. iii) To study algal flora of rocky and sandy soils.

iv) To study class wise percentage contribution of algal flora of cultivated and noncultivated, rocky and sandy soils.

v) To compare algal flora of cultivated and non-cultivated fields. vi) To analyses selected physicochemical parameters of soil samples. vii) To study rhizosphere algae of selected crops of study area.

E) Research Hypothesis-

The main aim of selecting this topic for research leading to Ph.D. degree is that in Latur district except very few reports not much more work has been done. There is a need to study soil algae

flora of this area in detail. It is necessary to understand ecological role of algae, to make aware farmers about the role of algae in crop fields.

In view of the above facts, the following points explains hypothesis of proposed research work:

i) To know the algal composition of cultivated and non-cultivated fields.
ii) To understand diversity, dominance and class wise percentage contribution.
iii) Soil algal biodiversity study would be able to taxonomists, phycologists, soil microbiologists, environmentalists to understand algal diversity, its role in fertility and ecology.
iv) Phycochemical parameters study of soil is important to correlate with dominance and diversity of soil algae.
v) Comparative study of soil algae from cultivated and non cultivated soil is significant in soil algal biodiversity study. vi) On rhizosphere algae earlier very little work has been done this is one of novel aspect of agriculture biotechnology. **F) Methodology:**

The proposed research work will be carried out in Ranapur tehsil of Latur district in the Marathwada region of Maharahtra.The algal patches from the moist places of cultivated, noncultivated, rocky area will be collected. Simultaneously soil samples also be collected in order to isolate and culture algal forms. Analysis of soil will be performed with the help of selected physicochemical parameters. Rhizosphere algae from different crops will be cultured and isolated by using algal media. The collected, cultured algal forms will be identified with the help of standard literature on algae.

G] Details of Collaboration, if needed:

i) Research Center, Department of Biotechnology, College of Computer Science and Information Technology, Latur (M.S.)

ii) Research Center, Department of Botany, Rajarshi Shahu Mahavidyalaya (Autonomous) Latur (M.S.)

H) Significance of study:

By knowing the local soil algal flora of Kharif and Rabbi crops , we can enrich the national and global soil algal flora. The proposed investigation will definitely enrich the knowledge in the field of soil algal diversity, seasonal variation, class wise percentage contribution. The study will be also significant in soil quality management. The proposed research work will helps to taxonomists, phycologists, soil microbiologists, environmentalists, agriculturist to understand soil algal diversity, its role in fertility and ecology. **I) A Tentative Chapter Scheme:**

Chapter 1- Introduction

Chapter 2- Review of Literature

Chapter 3- Materials and Methods

Chapter 4- Taxonomic Description

Chapter 5- Experimental Results

Chapter 6- Discussion

Chapter 7- Summary

Chapter 8- Bibliography

J) Plan of Proposed Research work:

Sr.No.	Time Duration	Expected work to be done
1	**First Year**	1. Extensive literature collection of concerned research proposal.
		2. Selection of field sites for soil algae samples collection.
		3. Algal flora of cultivated and non-cultivated fields of Kharif and Rubbi seasons.
		4. Isolation of soil algae from the cultured soil samples.
		5. Physico chemical assessment of cultivated soil samples.
		6. Algal flora of rocky and sandy soils
		7. Rhizosphere algae of selected crops.
		8. Observation and identifications of algal taxa.
		9. Microphotographs to be taken of identified algal taxa.
2.	**Second Year**	1. Extensive literature collection of concerned research proposal.
		2. Selection of field sites for soil algae samples collection.
		3. Algal flora of cultivated and non-cultivated fields of Kharif and Rubbi seasons.
		4. Isolation of soil algae from the cultured soil samples.
		5. Physico chemical assessment of cultivated soil samples.
		6. Algal flora of rocky and sandy soils
		7. Rhizosphere algae of selected crops.
		8. Observation and identifications of algal taxa.
		9. Microphotographs to be taken of identified algal taxa.
3.	**Third Year**	1.Analysis of data and preparation of graphs/ tubular forms
		2.Research papers publication
		3.Presentation for pre Ph. D. viva-voce
		4. Thesis preparation and submission
		5. Ph.D. viva-voce presentation.

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